William Holley: I'm going to talk specifically about section 433 of the New Energy Legislation, EISA 2007. In particular I'm going to go over first of all what's in the legislation, what the targets are. I'm going to talk a little bit about site versus source energy and we're going to address how to get there mostly through more efficient designs, renewable energy and there's a lot of issues that still remain in this legislation. There's a lot of questions about what's going to come out in the rule and so I'll address a few of those things as far as GSA is concerned. This is more or less exactly how the legislation reads. It says for all prospectus level, new federal buildings and for us that's everything over $2.5 million; it's for major renovations also. So it's not just for new buildings, it's for all buildings that we are renovating and repairing, which is going to be very difficult to do when you're talking about getting an existing building down to a zero fossil fuel usage.

It says the buildings shall be designed so that fossil fuel generated energy consumptions is reduced comparable to 2003 FY CBECS buildings, which CBECS, that's the last survey they did was in 2003 but you have to notice here that we're only talking about fossil fuel reduction. We're not talking about carbon reduction. That's because the energy legislation also contained a lot of information about bio fuels, which would be carbon fuels. So these reductions start in FY 2010. There's a 55% reduction on that in 2 fiscal years. 2015 as you can see it goes down until 2030 we're at 100% fossil fuel reduction.

Now the reason this becomes critical, at least for GSA, and I suspect for any of you out there that are in the building business, is that 2010; we are preparing the 2010 budget now. That budget will be submitted – is in the process of being submitted to OMB and we have to somehow budget for this requirement in our submission. Now Department of Energy is the one that's actually going to write the rule on this section and they've got one year from the passage of the legislation, which puts it around February of 2009 for them to write the rule. Being an election year, it wouldn't surprise me if that rule doesn't get pushed out a little bit further so that our 2011 budget submission will also have to address these fossil fuel reductions.

To give you an example of what this is going to mean to us and possibly to you, let's look at how much fuel is actually being used across the country. This is the ASHRAE climatic zone map and everybody; you know your fossil fuel usage will vary according to where you are in the country. This essentially has got seven zones in it and then it's divided into an A on the eastern part of the

country, a B in the sort of middle part of the country and a C in the marine zone on the west coast. And if you want to take a half a second and look and see where your buildings might be or your installation might fall on that map. I'm going to give an example that has to do with Washington, D.C. where about 30, 40% of our inventory is. So I'm looking at a climatic zone of 4A here.

Now this is directly out of the CBECS data and this information can be found on the web site below. This is a DOE web site where they have actually done some analysis on what it will take – how much, where energy is being used and what it'll take to reach these goals. I'm looking at office buildings here, 4A, that's about 97,000 Btus per square foot per year in an office building in Washington, D.C. That's the average usage in the 4A zone, which is the Washington, D.C. zone. Now the thing about CBECS is it is based on site energy usage. They go out to each building and they survey the building, how much energy you use, different types and so what they've got here is a site energy use.

The difficulty with the site energy use is you can't figure out how much fossil fuel you are going to reduce using site energy. So let me show you, this is a quick analysis of what this will mean to GSA with our buildings in the D.C. area. Right now we are at about 65,000 Btus per square foot. That's what our more or less average building uses in the D.C. area. The currents, the CBECS is about 97,000, a 55% reduction from the 97,000 will mean that we have to get down to 44,000 Btus per square foot in 2010, which is about a 32% reduction over where we are now. And that gets progressively less until in 2030 we have to be down to zero but some of those years, you know by 2015 we have to reduce another 25%. So we're pretty good right now. We probably picked most of the low hanging fruit and we're trying to figure out now how our submissions that we're putting in for budget now are going to reduce energy by about 32% from where we are, at least in the D.C. area.

The site vs. source problem, it's going to be interesting to see how DOE actually addresses this in the rule because as most of you are probably aware, if you're measuring electricity at the site, you know you get a one for one. I put in one unit of electricity; I get one unit of Btu out of that. And if you're only required to meet it at the site level, you could end up with some very strange scenarios like having all electric heat in Minnesota because you're not penalized for the source energy that's required to produce that electricity. So this is again a DOE chart, or I believe this is actually an EPA chart, that shows the ratio between source and site usage

for various fuel types. The question is how do you come up with a source energy that you're going to put – another part of the legislation actually requires you to identify how much energy you're going to use and then how much energy saving processes you're going to use and how many renewables you're going to use including photovoltaics.

Now it's a little bit of a catch 22 because they tell you when you submit your prospectus you have to identify how much energy you're going to use and then they've already told you, but don't use any more than this. So when you're looking at source energy, if you give a designer or submit a request saying we're going to use this much source energy, how do you break that out in thinking about where your design is going to come to? It's easy to go backwards. When you say I'm using this much electricity, this much gas or this much, you know district steam, how much you're actually using in source energy, but how do you give somebody a source energy number that will then translate into a building design? So that's, we're a little bit interested in how DOE is going to come up and do that.

Now the way that we did this, and of course this will probably change as the rule comes out, is we used EPA's Energy Star Target Finder to come up with what the source energy would be on our designs. Now you can go to Target Finder and I expect most of you may be familiar with this, but you can put in the number of people, the number of computers, the square footage, the type of building, and the zip code and EPA has already calculated or surveyed out the fuel use. How much in that zip code is used by different fuel types, electricity, how much of that electricity is produced by what I'll call renewable sources, hydroelectric, wind power, or perhaps nuclear power. And they will give you a site energy and a source energy for that zip code, that building type, an office building in D.C., 100 to 200,000 square feet, a certain number of people, computers, etc. They also give you the amount of carbon that that requires.

Now from there you can either, they give you the average number, you can then reduce that by 55% or they do have a way in the program to where you can put in a reduction factor. Unfortunately they have 50 and 60, and we're looking at 55% but you can run those two and then come up with an average number. The reason we found Target Finder very easy to use for our purposes is it does provide the source energy and it's based on the 2003 CBECS data. It allows for various building types although we are primarily concerned with office buildings and courthouses. It does allow for

courthouse use there and it gives you the energy mix by location and it's also a recognized data source. If somebody comes back to us and says, "Well where did you get this number from?" It's easiest for us to point to the Target Finder program to say that's where we came up with it. How DOE writes the rule, I'm not sure. It's going to be interesting to see how they are going to define how we will identify the source energy for the fossil fuel reduction.

Now to achieve the energy targets essentially, you know we are looking at basically four things here. The first thing is to design and build more efficient buildings. And a lot of the technologies that have been shown in this conference and demonstrated downstairs help us in that direction. You know what we can make better lighting and other things. But at a certain point, our buildings are going to get about as efficient as the technology is going to allow and we're going to have to look at incorporating renewable energy sources or non-fossil fuel sources in this case, into our designs.

To achieve the target overall, I mean the legislation just says they'll have to be designed to do that, but to actually achieve this is also going to require operations and maintenance involvement and tenant improvement. And overall, I think that one of the things that's not discussed very often is it requires an integrated management approach on how you look at this. Sometimes we end up with these things that look like Christmas trees, you know we put all these technologies all over and at the end of the day we don't quite get the effect that were looking for. But we have to have an integrated management approach on how we're going to incorporate all these technologies in order to achieve our energy goals.

A very interesting document that's available, at least where I've found it was on the whole building design guide, but it's available you know over Google or from the National Renewable Energy Lab is this assessment of technical potential for achieving net zero energy buildings in the commercial sector and this was done by the organization as you can see up there, the Department of Energy and the National Renewable Energy Lab. It was done to achieve net zero energy in 2025. So it's a little bit off what we're looking for, but it actually is a very good technical report and addresses all the technologies that are in buildings. This speaks to you know, how efficient can you make a building. Now their numbers are certainly gross numbers, they've taken numbers nationwide, averaged things out, talked about projecting technologies to 2025 and how efficient those technologies are going to get. And so

certainly there is a lot judgment and some subjectivity in the report but still it gives us a foundation to sort of build upon about where we think, how efficient do we think we can make our buildings and then after that, how much renewable energy do we have to have in order to come up with, to meet the EISA goals.

A few things they talk about, lighting as you can see, they're reducing lighting maybe by about two thirds is what they think will happen by 2025. Some of the other technology is pooling, maybe not quite by half, heating, pretty optimistic on heating going down to a third and various other things. The bottom line is their average building was using about 70.7, 71K Btus when the report was put out in 2007. They think you can get down to about 40.3 using what they call Max Tech, which is the terminology they use for how much technology will improve the efficiency of these buildings. Now there may be other ways that you can get buildings to be more efficient. Certainly you can site them and orient them in different manners but this is sort of a good guess about where the building technology will be. It looks like using what are projected technologies; we could expect to have a building that's not quite half the energy user that we have today. So we're looking at maybe a 50% more efficient building just using projected technologies.

The other thing that we found when we start looking at how to make buildings more efficient is that often we're looking at just one side of the equation. And these next two slides, what I want to discuss with you is the need to look at this as an integrated approach and not only on a seasonal basis but on a systems basis. This is another slide that comes out of DOE. They're talking about what is affecting the cooling load. As you can see solar and lights nearly match the net cooling load. Now there's things in here you can't do much about. Your people load, maybe you can do a little bit about the electrical equipment load, the plug load, this study actually assumed that you couldn't do too much about that but there are things that help you in the cooling, when you have a cooling, when you're cooling the building. The ventilation helps you some, the infiltration helps you some, foundations, wall, there is some air coming in from the outside. Now of course in Arizona that might not help you a whole lot, but overall you get some net gain in cooling from these things and then you're trying to cool mostly the lights and the solar.

The difficulty of course is when you switch to the heating mode, those exact things that you were trying to reduce in the cooling load, if you reduce your lighting, if you make it 50% more efficient and it uses less energy, if you reduce your solar exposure, those

things hurt you in the heating mode. As you can see on this slide, what is contributing to the heating in part is the solar and the light load. Your light is as much as 23% and this is of course a national average based, this study shows. If you reduce that by half, where do you get that heating from? Do you pick it up here? So there is a very strong need to have an integrated approach on these things and a lot of the designs that we're seeing, talked to one approach or the other but you know we talk to day lighting but when we talk to day lighting, are we looking at our solar heat gain? If we're talking about solar heat gain, if we're reducing that, how is that affecting our heating loads? And it varies of course by location throughout the country that it requires a good designer and a very integrated approach to successfully reduce energy with the technologies that we have.

This is just a slide that sort of shows where we're at and where we're heading to. It's a little bit off scale because years are – I should have bunched them up a little more than this but you know right now we're at about 97,000. That's what the CBECS date it is. GSA right here is about 65,000. As we reduce this by about half over time to 2030, we've got a start – and this is the EISA curve going down to zero fossil fuel usage. We're going to have to start picking up renewable energies.

Now the question is how do you assume that when you're going into the planning and budgeting of your building and how do you do that when you're submitting cost to Congress? Because you know certainly a lot of renewables are more expensive than their non-renewable alternatives. It may be cheaper for us to buy electricity off the grid then it would be to produce it through some type of renewable system. And of course the renewable energies that broadly are out there, the solar water heating, there is about a 30% soft mandate in the EISA legislation – there's a soft mandate that we have 30% of our domestic hot water heated with solar. It says if that's cost-effective so maybe in some areas it's more cost effective than others.

Photovoltaics - there is a requirement that we identify our photovoltaics when we send in our submissions. Certainly wind turbines may be a solution, ground source heat pumps, there's a soft mandate and a lot of information on the ground source heat pumps in the legislation and biofuels and biogas would allow us to meet these EISA goals. There are questions in our mind about things like, if a district steam system uses biofuel and provides us the steam, do we count that? Can we buy credits for renewable energies? Can we enter into PPAs in order to provide our

renewable energy? This is difficult for us, especially when you're talking about urban locations and large high-rise office buildings. There is very little opportunity for photovoltaics on them and I think that was recognized in the previous report.

So some of the remaining issues with this legislation that are not very clear and hopefully will be cleared up by DOE and I don't envy them, the process of writing the rule is how will this apply to major renovations and historic buildings. It's one thing to say that you can design a new building to be 30% more efficient if you're talking about repair of the commerce building in downtown D.C. You may be spending $1 billion over 10 years to upgrade the building but you're not going to reorient it, you're not going to put solar panels on the roof, you're not going to improve energy performance of that building. It's just there. To get down to 55% less than it is now is going to be extremely difficult to do.

How will the source of energy goals be set? Like I said, we used EPA's Target Finder that it's going to be up to DOE to describe how they actually come up with the source energy. It's hard to start with the source energy and then move forward. It's much easier to say we'll use this much energy, we are using this much electricity, and move back from there. So it'll be interesting to see how they write the rules. How to address renewable energies for office buildings and urban centers, well how much of the renewable will have to be on site or on the building or will we be able to procure that by some other method?

It's very difficult to budget and fund for this stuff. If we think that we are going to reduce in 2010 by 30% and we have to pick up 30% of that by renewables, which renewable technology do you pick, how much money do you put in for that renewable, do you think you're going to buy it some way or what costs are you going to project in your budget so that you receive enough funding to actually build a building to meet these goals. There is also a question of how much more design is going to be needed and whether there's going to be additional design funds needed to meet these goals.

At least in my experience there is limited expertise in the design community to meet the goals. There's a lot people that talk about meeting them but when you look at how integrated some of the designs are, we still haven't gotten to where we're getting what I would call a core design group, not just group but there the industry is not evolved to where they think about energy as a complete design process. You know energy is often an added-on

goal and it seems to be addressed in part by putting in a particular technology. Let's look at day lighting, let's look at maybe a particular building but to integrate that across the seasons to meet this goal is where we need to go with the design community and I don't believe that they've quite come together to provide that yet.

And then certainly the availability and speed of development of the needed energy efficient technologies; if lighting is really going to go down by two thirds, you know we really have to start working on that now in order to meet these goals by 2010 or 2025 as that report showed. If heating is going to go down by two thirds, well that's you know, we've got a ways to go to get those not only technologies developed but commercialized into the design community and available to be constructed to where they will actually help finish that up.

Mark Ewing: I am going to briefly address some of the leasing actions GSA has taken. Briefly section 435 of EISA requires that beginning on December 19th, 2010, and this is like the other boot, they told us how to build new buildings and gave us the challenging goal, now they're telling us you know how we're going to lease buildings and it's an equally challenging goal on our part. So 2010, no agency shall enter into a contract to lease space in a building that has not earned the Energy Star label in the most recent year. Rather than require Energy Star certification, agencies need only require a lesser to undertake all energy efficiency and conservation measures that are estimated to be cost effective over the life of the lease if no such space is available, the occupant agency is remaining in existing lease space, the agency has proposed to lease building of historical architectural or cultural significance or the lease is less than 10,000 gross square feet.

What's GSA done? We've revised our solicitation of offers to reflect the Energy Star requirement. The current status is GSA's SFO, already requires new lease construction to achieve an Energy Star score of 75 or above within one year after reaching 95% occupancy and to retain the qualifying Energy Star score or better. And I think that's an annual requirement. Pursuant to the EISA requirement, GSA will require Energy Star certification for all leases except those meeting the exceptions above beginning in December 2010. For existing buildings, each offer will be required to submit with its offer, a statement of energy performance from the Energy Star portfolio manager web tool. So that GSA can compare a new construction with existing building in a procurement, offers of new buildings will be required to submit an Energy Star statement of energy design intent based on the

estimated energy consumption and the expected lead energy points.

We're conducting industry forums to figure out how they're going to meet this requirement. One of our leasing specialists said we'll never lease another building again but we'll see. I think we're a little bit more optimistic than that. Status, GSA will conduct a series of forums across the country on the new Energy Star and other requirements, such as LEED silver, to ensure adequate competition and to prevent the requirement from increasing cost for GSA. GSA will also collaborate with industry groups such as BOMA and IFMA through their existing educational programs to inform lessers of the requirements and ways to improve a facility's performance. So we just added that to the session for anyone who's in a GSA lease space and is interested about energy efficiency, what GSA can and can't do, what leases we're trying to do.

The last thing we're going to talk about is the EISA '07 requirement that GSA set up a federal high performance green buildings program and I'd like to formally introduce Kevin Kampschroer. He is the acting director of this new office and it's my pleasure to have worked with Kevin for the last five or six years. We made an interesting team, what you might describe as boardroom meets back alley; I'm not sure. Probably figured out who's who by now. But just to give you a little background or definition of a description of this new office, basically what Kevin's attempting to do is create a new office within GSA to consolidate and coordinate federal efforts in the broad realm of building sustainability, influence and accelerate industry capability and adoption of sustainable principles across all aspects of asset creation, operation, maintenance, and disposal. He will be leading GSA's activities in response to the 2005, 2007 energy bills and executive orders on the environment, sustainability, and energy conservation.

He's most famous in GSA for his creation of the Workplace 2020 program, which gets to things like high wall cubicles and just things that don't make sense for worker productivity and he's launched that into a relatively permanent management practice, accepted practice within GSA's space design. He was a project manager at the Ronald Reagan Federal Building International Trade Center, which was at the time the second largest office building in the U.S. at 3.2 million square feet. He was key to developing measures of businesses linked to both budgeting and rewards, which won the Coronet Global Innovation Award. He is a lecturer at MIT, Harvard School of Design, Yale, Stanford, Johns

Hopkins, and Georgia Tech. Been working at GSA for 34 years; that explains the gray hair. I thought it was being my supervisor but that's a long time. And last, he's a graduate of Yale University; please welcome Kevin Kampschroer.

Kevin Kampschroer: The Energy Independence and Security Act of 2007 and Executive Order 13423 are all about change. They're about changing the dynamics, changing the rate of change in the government, and shifting the way we think about what it is that we have to accomplish. William was pretty eloquent about the difficulties that we're facing and the things that are unknown. What's great about working with William and Mark and the other people in GSA and across the government on the interagency working groups and in places like this is that what you find is that the ingenuity and creativity of people when facing daunting challenges, which we're certainly facing as our opening speaker yesterday really I think articulated in a particularly good way, is that that creativity is a very hopeful sign. I think it really means that we are up for the challenge that we have and we're up for the change in the focus.

I think that one of the interesting things, the most salient thing that happened between the Energy Act of 2005 and 2007 was the shift from the definition of high performing buildings to the high performing green buildings. And the shift was very minor in terms of the number of words, but really dramatic in terms of its impact. We really are changing from a focus on the building and a performance of the building to a focus on the intersection between what's happening in the building and the building's management and what's happening inside the building by the people who are working there. It's one of the things that I think makes working at GSA exciting cause our mission basically says that we will provide office spaces, working environments for people in the federal government in order for them to achieve their mission. If you don't achieve your mission in your agency, there's no point for GSA to exist.

This focus on what goes on inside the building is really the big shift in the law. It says that we don't need the building to have a nice building. We don't need the building to have an architectural award. We need the building because stuff happens inside the building that's important to the country. It means also that we have to change our focus from design of new buildings to performance of existing buildings in a portfolio point of view.

A lot of the focus that has been going on in the interagency working groups lately has been on how do you apply guiding

principles that were originally designed for new construction to existing buildings. I think it's worthwhile to look for a moment that what that means. William talked about integrated design and the fact that we don't have necessarily the infrastructure in the country yet that delivers integrated design as a matter of practice. That's absolutely true. And if that's true for the design, just imagine how difficult it is when you talk about the integrated assessment operation and maintenance of buildings today.

What we are seeing over and over again is you go from a design goal of this to a handoff to buildings operations to actual building and use to a radical degradation in performance. And I think that we really have to shift our focus from design and delivery to design delivery, operation, and maintenance as one seamless integrated process. That is a huge paradigm shift from the way we're actually doing it right now. Our colleague Vivian Laughlin tells a very funny story about, just imagine if you bought a car in the same way that you bought a building. So let's just imagine this for a minute.

You go out and you buy a car like you buy a building and you go there and you talk to the people and you say this is the kind of car I'd like, and they say, "Yeah, I got it. Come back in a couple years, we'll give you the car." So you have some conversations, you come back, maybe you see a sketch of the car and so on and a couple of years later you get the car. It does not come with a user's manual and 30% of the systems in the car don't work, and don't worry, the dealer says, "That's all right, we'll take care of that but it'll be a year or two before we work the bugs out, but it's all right, just go ahead and drive it and you know, figure it out and a little feedback would be nice but by the way, our contract's over so you're going to talk to this guy down the street."

Now he's had nothing to do with the design process so far but he's going to take care of your car for you and then you take it in to him and say, "Well I don't know how to work this air-conditioning, it's supposed to work. I turn on the switch, it looks like it's a switch." But and he says, "Well I don't know how this is designed so I think I'll just take this system out and we'll just turn it on all the time." And that's kind of like the way buildings are actually built and delivered and they don't do it.

She tells another funny story too where she deals with CEOs of corporations and she talks about, well what's a high performing building you know? And they put up flip charts and everybody brainstorms and they come up with like three bullets. And they

talk, well let's talk about something that maybe you know about. Here is a Volkswagen Jetta and here's a Mercedes-Benz F5000 SL. Tell me the difference in the features of those two cars. And they fill up 20 flip charts in no time at all. It's all about knowledge of the technology and knowledge of what you're getting for the money, and I think that's really a lot of what we're dealing with here is we're dealing with a very fragmented industry that we need to pull together and to be able to communicate to decision makers, budgeters and so on in a way that we haven't done before.

When we're talking about optimizing energy performance in design, again, William talked about. We were talking about what that means for buildings that are in operation, the measurement criterion is really moving towards empirical verification. Whether its measurement and verification is a part of an ESPC contract whether it's a process of verification using third-party certifiers or whether it's the re-commissioning retro-commissioning program that is set out in the law. It's getting an independent party in to actually verify that those kinds of performances are being delivered as well. So then we talk about indoor environmental quality too. In EISA, there is a requirement that we develop, and we talk about indoor environmental quality during construction a lot but we need to be talking about it over a period of time. Very significant health impacts for all of the things that we decide to do in building operation and maintenance that are relatively little understood by the building operators that we hire and by the people who actually operate within the building.

One of the things that we find over and over again, certainly in our inventory as well as elsewhere, is that that intersection, whether it's in energy performance or indoor environmental quality performance between what the building manager does and what the building tenants and occupants do is vitally important. In those cases where we've made really dramatic improvements in energy performance in our buildings as a result of renovation, we estimate that somewhere between 30 and 50% of the improvements in energy performance come from us talking to the clients in the building, the people who are actually in the building, and changing the behavior of people in the building. Whether it is the plug load, whether it is the management of the IT devices in the building, whether it is the behavior that people understand about lighting, you know the ability to change the behavior with lighting alone is really significant when people understand that most of the lighting standards that we are designing to today were actually based on laboratory studies for work habits that predated the invention of the personal computer.

So we're looking at lighting standards that don't take into account that we're dealing 50% of the day with a device that produces its own light. And the head of facilities at United Technologies commiserates with me periodically because he can't convince the CIO of United Technologies that it makes sense to replace the cathode ray tubes because they consume three times as much energy as flat screens because that comes out of the CIO's budget and not facility manager's budget and the heating and cooling and the electrical load comes out of the building manager's budget which the CIO doesn't care about. So it's not just the government that has big conglomerate issues, it's everybody. And getting those kinds of intersections actually working makes a huge difference.

When we're talking about third-party certification, especially with the application of guiding principles to existing inventory, which we're required to get to 15% in the very near future, we really are talking about independent third-party certification using existing systems, whether it's Labs21, Energy Star, LEED for existing buildings and there are several others. But it really represents a shift in thinking about specifications to performance and we've talked about performance contracting for a long time. I'm certainly thinking that we're going to see a lot more performance contracting in the future. When I was talking a couple of years ago with the U.S. Green Building Council about what happens after LEED really achieves its market transformation, I said you really have got to ditch LEED. I mean it's a great brand blah, blah, blah, blah, blah, but you need something else and I even gave them the term. I just wish they would adopt it, they need to switch from LEED to LEEP.

What we really need is Leadership in Energy and Environmental Performance. Design great, delivery, fine, performance is what really counts and its performance over time and that really is where you start seeing the intersection of buildings and people. And if that intersection of buildings and people, buildings and organizational performance that really creates value. It creates value in the asset market. We're seeing already today that there are financial incentives for people to deliver green buildings. There are decreases in loan value. There are increases in appraisal value and so there is already a financial incentive for producing green buildings because buildings that perform better are believed, and I think it's true, that they will hold value better over time.

None of our rating systems, none of our thinking processes today allow you to put the plaque on the wall for the building that you

didn't build because that is the most sustainable building that we can create - the one that we don't need because we figured a better way to use existing assets, a better way for people to perform, a better way for people to interact. It requires a significant change in thinking. It also requires some understanding about how people meet, what are they doing there. It requires changes in the way we manage people in the space. When Boeing Corporation decided to really emphasize work at home because for some reason people in Seattle think they have a traffic problem.

I live in Washington D.C., which really does have a traffic problem. My daughter goes to school in Los Angeles, which makes Washington seem like it doesn't have a traffic problem. But what they did the first two years of their work at home program was retraining first line managers in how to supervise. Two years investment in interpersonal relationships and shifting from a performance mantra of outperform by seeing people at their desks to I will manage by outcome. A huge shift in thinking about the way people relate to each other that resulted in a 50% reduction in their consumption of the resource called real estate. That is a sustainable approach to the use of real estate that increases the value of the corporation, decreases the overall cost structure, and changes the performance levels.

Byproduct, they got higher performance levels from the people because they changed the management structure and they changed the whole thinking about outcome. It's not a real estate driven decision. It becomes a business driven decision and that's really what we need to do. So you know, I think it's Btus per square foot, per person, per hour. Yes it's more difficult to understand. Yes it's more difficult to measure. Yes it leads you to a better outcome.

The new integration that I'm trying to get across here is really talking about the building in use, not the building as a thing in itself. It means that there has to be a huge increase in the integration and building operations and tenants. I mentioned before that we figure that we can double the energy conservation of any technological improvements in the building by adding behavioral changes in the tenants in there. And you just look at that in the lighting and the plug load, 30% of the building today and as we increase energy performance and energy efficiency of the building, that lighting and plug load goes up as a percentage, not down as a percentage.

As we look forward also, we're going to see significant changes in the way we measure in other areas. We're going to go to more

systematic means of measurement. It is I think absolutely inevitable that we will be in some form of carbon measurement in the relatively near future. Both of the presidential candidates, the presumptive presidential candidates have already announced that they support the bills that are on there, on the floor. It means that we as a community need to increase the sophistication of our measurement and the sophistication of our understanding.

There's already a protocol for carbon measurement. It's been around for 10 years. It's not like measuring Btus per square foot. It is far more sophisticated but it gives you a richness of data that enables you to make better and better decisions. It also means I think, that we have to increase our understanding of the human factors that lead to the performance in buildings. We need to know as building operators and as the real estate people and as the energy people, what's actually going on in the building.

I won't mention the building but I talk about a building where we discovered that the operator of the little data center that was less than 10% of the total square footage of the building that he needed to keep the building, his room, at 55° year round, 24/7 because he didn't have a belief in the reliance of the UPS and the generator kicking in. So he wanted that extra hour that the 55° gave him. Now that's 55° when he should have been operating at 80+ degrees in the data center, 24/7. Don't even tell me what it did to the energy bill. Don't even tell me what it did to the cost. But it's the operator; it's the user of the building in that intersection that really leads to the positive change there.

I think also that we have to think about where's the edge of the building. We are already looking at huge changes at the portfolio level. There is no possibility for any of us with a portfolio of assets to achieve an overall portfolio reduction of 30% if we treated each building like it has to have a 30% reduction cause we can't go in and modify the performance of every single building in the portfolio 30% at a time over 50 years and then get to a 10 year goal of 30%. It means that we have to maximize every single project. We have to push the energy service companies to do far more than they have been doing in the past. We have to push all of the designers to be doing far more than they've been doing in the past. We have to set stretch goals that are much, much different.

80% reduction in energy usage in a renovation, then you might get a portfolio average of 30% off. I don't see any other way to do it. It means that we really need to start thinking of the edges of the building being in the neighborhood rather than in the building.

Maybe it's the community, maybe it's the city, especially in urban environments, you don't typically have the footprint where you can deal with things on a building basis but you might be able to deal with them on a city basis or a neighborhood basis or a community basis. You start looking at where's the vacant land, how can we do it, how can we use the geothermal here, how can we use the solar energy there. We can put a little bit here and a little bit here and in the aggregate we make a huge difference in ways that we don't do it but it means that the walls have to be not the boundaries of our thinking and we have to expand those boundaries of our thinking further.

Does it mean much more distributed local generation? I think it does. Does it mean different kinds of her approach to co-generation? I think it does. It means that new technology has to change, new technology and control systems. What we're finding for example in the lighting arena is that the improvements in control systems can cut 30% of the lighting load out without changing behavior and if you couple the two of them together, you do even more. It also means that we in the federal community need to be very deliberate in pushing in the same direction at the same time.

When we're talking about really combining the buying power of the federal government and pushing technologies, we have to do that overtly and I think that's part of the goals of the new law to do that. Within GSA, I'm surprised William didn't even mention it. What it means for us is fewer, better projects. We really have come to the realization that the source of money is relatively finite and we've got to maximize every project, which means we're going to be doing fewer of them but the ones we do, we're going to make sure that they're extremely good, and integration with metrics that persevere over time.

It really does mean that we have to apply all the ingenuity that exists in all of the disciplines that we have at our hand and change the behavior of those disciplines that work inside the government with the service providers, with the people that are outside the service provider realm in the traditional realm, whether that's the utilities, the grid operators and so on, to change mission impossible to mission achievable. And we should remember that that goal that Mark started off the discussion with, 2030, 100% better than CBECS, you know 100% is very easy to understand. It means none. It's very, you know 55%, you got all these measurement issues, 100% you don't have a measurement issue, you don't use any. But that's only a step. Part of that goal that wasn't enacted is

the 2050 goal to have the portfolio be neutral by 2050; every existing building by 2050 be neutral in the use of fossil fuels. And that means that we really have to change the thinking that instead of what we're trying to do this year and next year, it's really understand as our opening speaker really tried to lay out, is that we are really trying to do this in order to leave a legacy that outlives everything that we do and lasts for the generations to come.

It's worthwhile remembering, I like to remember it cause I am one, that the word bureaucrat started out being one of the best things that you could be. It was invented by the French to distinguish the people who had the most influence over society and the ones within which the future of society was vested. And I think what we've done in this law and in the other things that we're hearing, is that there is a demand from the American people and American industry for the federal government to lead by example and restore that original meaning of bureaucrat as being someone in whom is vested the future of society. And that's what I hope we can do. Thank you.

[End of Audio]